



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Advait Arumugam</b>	<b>Project Number</b> <b>J1104</b>
<b>Project Title</b> <b>The Study of the Impact of Anthropogenic Carbon Dioxide in the Ocean and Novel Methods to Reverse Ocean Acidification</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project has two objectives. 1) To study how Ocean Acidification affects the health of seashells. 2) To analyze which is the best solution to mitigate Ocean Acidification out of (i) shoal grass, (ii) limestone, (iii) crushed seashells, or (iv) a mixture of crushed shells and limestone.</p> <p><b>Methods/Materials</b> In order to accomplish the first objective, I monitored seashells in a jar filled with acidic synthesized sea water. I did qualitative observations of the seashells in terms of shape, texture, and color and measured the changes in pH with a pH meter over a period of twenty five days. To accomplish the second objective, I grew shoal grass in an aquarium filled with acidic synthesized sea water. I also filled three other jars with acidic synthesized sea water. In the first jar I put the crushed seashells. In the second jar I put the limestone and in the last jar I mixed the limestone and crushed seashells together. Over the course of twenty five days I regularly measured changes in the pH. I also used a hydrometer, CFL lamp, and thermometer to maintain water quality and keep the shoal grass alive.</p> <p><b>Results</b> For the study of the impact of Ocean Acidification on seashells, I observed that there was a significant deterioration in the color, texture, and shape of the seashells. Another observation I made was that at the end of the experiment the seashells flaked off and the pH of the water increased. For the second part of my experiment, I observed that the change in pH of the water in the aquarium of shoal grass was greater than the other solutions. The jars with limestone and mixture of crushed shells and limestone both had same change in the pH. Lastly, the jar with crushed shells alone had least change in pH. These observations were consistently observed both times I did the experiments.</p> <p><b>Conclusions/Discussion</b> The observations from the first part of my experiment prove my hypothesis that sea shells deteriorate in acidic water. It can be concluded from the results of the second experiment that shoal grass is the best solution out of all four for mitigating Ocean Acidification. The other solutions also had significant effects on increasing the pH and therefore, we can conclude that all four of the solutions could be implemented to reduce Ocean Acidification. We can use the appropriate solution depending on cost, location, and compatibility with the nearby ecosystems for each area intended to be treated.</p>	
<b>Summary Statement</b> I proved that Ocean Acidification degrades seashells and out of the four solutions proposed, shoal grass was the most efficient method to mitigate Ocean Acidification.	
<b>Help Received</b> My parents funded this project, helped me obtain materials, and reviewed my report.	